**Small Business Innovation Research/Small Business Tech Transfer**

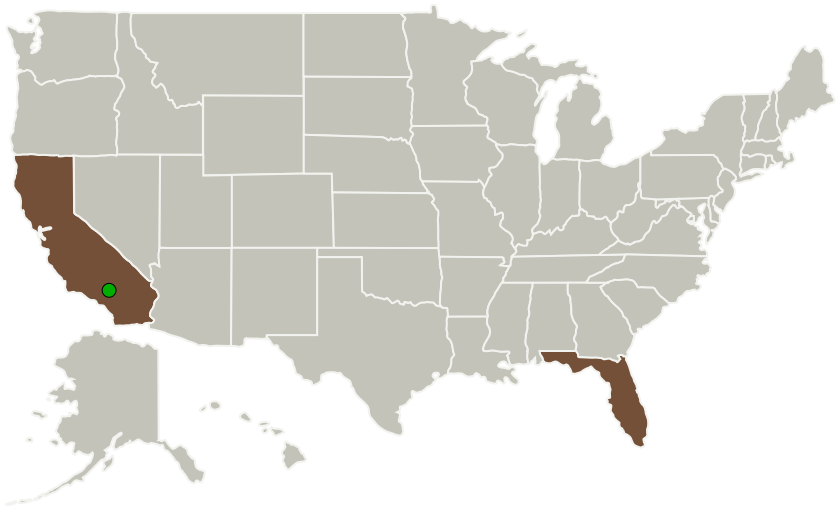
# Attitude Control Enhancement Using Distributed Wing Load Sensing for Dynamic Servoelastic Control, Phase II

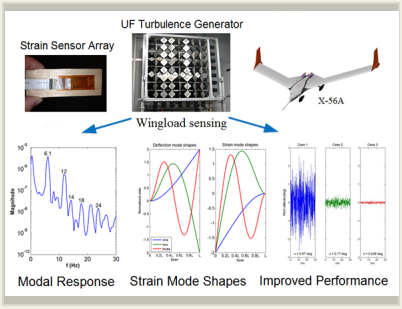
Completed Technology Project (2014 - 2016)

## Project Introduction

Strain sensor information is used in nature to achieve robust flight, good rejection of wind disturbances, and stable head motion. Similar man-made sensing devices will be used to demonstrate flight control using Fly-by-Feel, with the overall objective of achieving similarly good performance with piloted and autonomous vehicles. The Phase I work demonstrated the feasibility of using strain sensor arrays for flight control applications. This was done using hardware testing on a wing in a laboratory setting. An important part of showing feasibility was the use of novel frequency domain identification techniques, which were used to identify both modal frequencies and strain mode shapes. The proposed work will develop the ACES system: Attitude Control Enhancement using Strain sensors using both wind tunnel and flight test demonstrations. Acceleration feedback is known to improve the gust disturbance rejection, and the same will be demonstrated in an active control experiment using strain sensors in a wind tunnel. A second experiment will be conducted using a different and more flexible wing to demonstrate active control of shape. Modeling and simulation will be used to begin the transition of this technology to larger commercial vehicles.

## Primary U.S. Work Locations and Key Partners






Attitude Control Enhancement Using Distributed Wing Load Sensing for Dynamic Servoelastic Control

## Table of Contents

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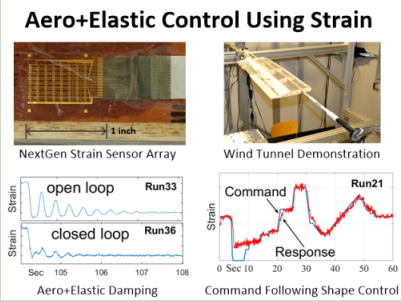
# Attitude Control Enhancement Using Distributed Wing Load Sensing for Dynamic Servoelastic Control, Phase II

Completed Technology Project (2014 - 2016)

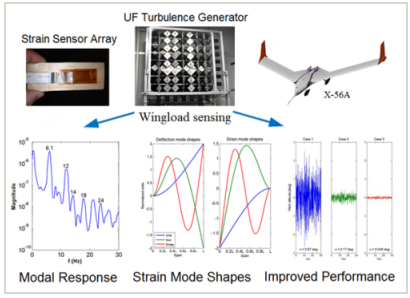
| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| Systems Technology, Inc | Lead Organization | Industry | |
| Armstrong Flight Research Center(AFRC) | Supporting Organization | NASA Center | Edwards, California |
| University of Florida | Supporting Organization | Academia | Gainesville, Florida |

| Primary U.S. Work Locations | |
|---|---|
| California | Florida |

## Images




**Final Summary Chart Image**
Attitude Control Enhancement Using Distributed Wing Load Sensing for Dynamic Servoelastic Control, Phase II Project Image *(https://techport.nasa.gov/image/134393)*




**Project Image**
Attitude Control Enhancement Using Distributed Wing Load Sensing for Dynamic Servoelastic Control *(https://techport.nasa.gov/image/130361)*

## Organizational Responsibility

**Responsible Mission Directorate:**
Space Technology Mission Directorate (STMD)

**Lead Organization:**
Systems Technology, Inc

**Responsible Program:**
Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**
Jason L Kessler

**Program Manager:**
Carlos Torrez

**Principal Investigator:**
Peter M Thompson

**Co-Investigator:**
Peter M Thompson

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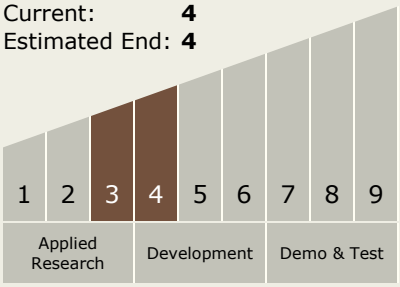
## Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**




## Technology Areas

**Primary:**

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.4 Environment Sensors

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System